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Art. XV.—*A low-lag thermocouple with a new type of insulation.*

By E. F. J. LOVE, M.A., D.Sc., F.R.A.S., F.P.S.L.

(University of Melbourne.)

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In the course of investigations carried out recently by the Freezing Meat Committee of the Australian National Research Council, my attention was directed to the need for a well-insulated thermocouple which should lag in temperature as little as possible behind the substances in contact with its junctions. I therefore decided on an attempt to coat the junctions and leading-in wires of the couple with a film of rubber, by deposition from a rubber solution, in the hope that an insulating film might be obtained sufficiently thin and of reasonably lasting quality. The following method proved successful.

The junctions and a sufficient length of the wires were immersed, after cleansing, for about a minute in a solution of crepe rubber in benzine—petroleum motor spirit—allowed to drain and dry in air, and then vulcanized, by immersion for a few seconds in a 3 per cent. solution, also in benzine, of sulphur chloride—S_2Cl_2—followed by drying in air. The commercial solution of rubber used was found to require dilution, in order to obtain a smooth film without the formation of beads; commercial benzine proved a suitable diluent and the proper strength of the solution was quickly found by trial. The film obtained being very thin, a second film—and, in some cases, a third or even a fourth—was deposited over it.

The resulting layer of insulation proves to be tough and elastic, withstands the changes of dimensions and of temperature hitherto encountered in the Committee's work, and adheres well to the metals. Couples so prepared have been calibrated and used by Messrs. Cook and Vickery, who are carrying on researches for the Committee; they inform me that the lag is much smaller than that previously experienced, when the couples employed were insulated by thin glass or thin rubber tubes. As one consequence, the duration of the "latent period" in refrigeration can be fixed much more precisely[1] with the new couples—a result which the Committee's previous work shows to be important. Moreover, the rubber films have proved, so far, to withstand the rough usage to which the couples are necessarily exposed in the Committee's work, without cracking or disintegration; this was not the case

1. The limit of precision is now prescribed, not by the lag of the couples, but by the rate at which the consecutive potentiometer measurements can be carried out.

with the thin tubes, whether of glass or rubber, previously used; nor with thin films of shellac or of celluloid, with each of which—in the hope of reducing the lag—experiments were made before the method here described was worked out.

As the materials employed in preparing this form of insulation are all regular articles of commerce and the operations are extremely simple, the method may possibly find other applications in laboratory practice.

I desire to thank Mr. A. M. Munro (Director of the Chemical Laboratory, Dunlop Rubber Co. of Australasia, Ltd.), in consultation with whom the kind of rubber solution to be employed and the vulcanisation of the films were decided on, and who very kindly presented me with the rubber solution and sulphur chloride used in these experiments.